RG-DIGITAL CONTROL
Installation Manual

ROYALL

www.royallgrills.com 325 South Park Street Reedsburg, WI 53959 Phone 608-768-8508

CONTENT

MAJOR FEATURES 1

REMOVING THE OLD CONTROL..... 2

INSTALLING THE DIGITAL CONTROL..... 4

TESTING THE GRILL 6

OPERATION OVERVIEW..... 7

UNDERSTANDING THE DISPLAY 8

CONNECTING THE GRILL TO AC POWER..... 9

IGNITING THE GRILL..... 9

COOKING..... 9

SMOKING..... 11

UNDERSTANDING IDLE FUEL FEED RATE & SMOKE SETTINGS 11

ERROR MODES AND MESSAGES 13

WIRING DIAGRAM..... 14

AC AUGER THEORY OF OPERATION 15

TROUBLESHOOTING..... 16

ROYALL

MAJOR FEATURES

The RG-Digital Control is a plug-compatible replacement part for the Royall Standard 3-Speed Control and is compatible with the entire line of Royall wood fired pellet grills. Typical Applications High performance upgrade replacement for Royall Standard 3-Speed Control.

- Three Digit Temperature Display
- Front Panel Cook Control
- Eight Cook Temperature Settings (180 through 375 degrees)
- "High" Cook Temperature Setting
- Front Panel Smoke Control
- Sixteen Smoke Settings (P0 - P15)
- Ignition Indicator
- Smoke Setting Indicator
- Cook Idle Fuel Rate Indicator
- Low Temperature Indicator
- Inadvertent Start Protection
- Over Temperature Protection

How It Works

Cook Mode In Cook Mode, the temperature of the grill is constantly monitored and a microprocessor operates the draft fan and fuel feed auger to maintain a constant grill temperature.

Smoke Mode In Smoke Mode, the fuel feed rate is set manually by the operator. The grill operates at low temperature to provide maximum smoke.

RG-Digital Control comes standard in the following Royall Grills:

RGPRO

RG2000

RG3000

RG5000VS

RG-Three Speed comes standard in the following Royall Grills:

RG1000

RGTAILGATER

ROYALL

REMOVING THE OLD CONTROL

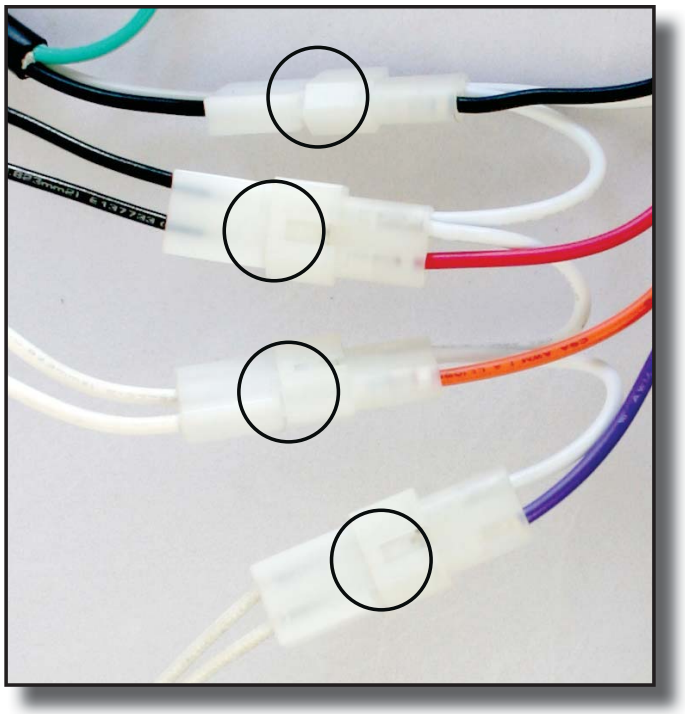
Required Tools
Medium Phillips screwdriver
Small slotted screwdriver
Power Screwdriver 1/4" Only

Unplug the Grill
Unplug the grill from AC power.

WARNING **AC power is present on the control at all times and is a shock hazard unless the grill is disconnected from the wall socket or AC line.**

Remove Hopper Panel Access Cover
This Panel Access Cover protects grill components while allowing air to flow into the draft fan. Remove the screws and panel from the grill. Royall's new RGPro does not have an access cover. Unscrew hopper front as well as old control to access internal equipment.

Disconnect the Control
Working under the grill, locate the control's wiring harness. Disconnect all four plugs that connect the control to the grill's components (fuel feed auger, draft fan, igniter, and AC power).

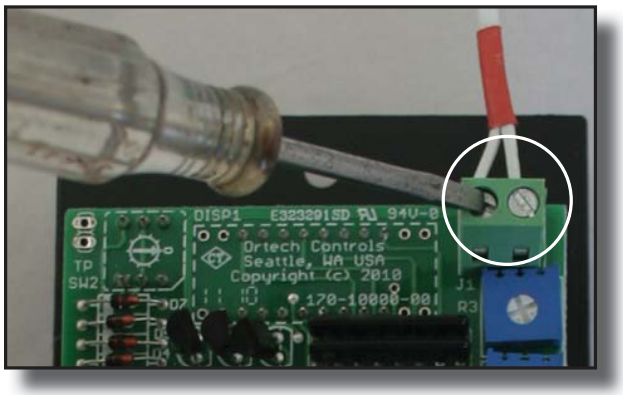


Remove the Control

Remove the faceplate screws using a medium phillips screwdriver. Save the screws for use later. Gently pull the control forward, rotating it slightly to the right. Once clear, pull the wire harness up and out of the cutout.

Disconnect the Probe

If you are removing a Royall Digital Control, you must disconnect the probe. Turn the control until the circuit board is facing you. Using a small slotted screwdriver, disconnect the probe lead wires from the two-terminal connector J1 located in the upper right hand corner of the printed circuit board.



Remove the Probe

Open the cook lid and locate the probe. **Probes are all located on the left side of the grill except for the RGPRO which is located on the right side.** Loosen the mounting screws. Lift the probe and feed its wire leads up and out of the grill.

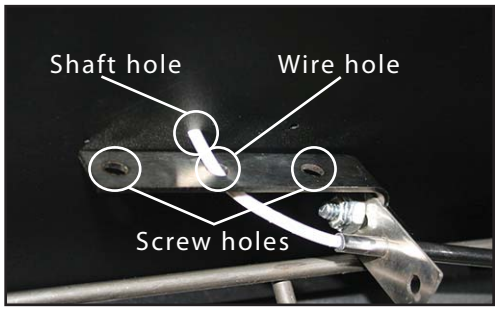
INSTALLING THE DIGITAL CONTROL

Position The Probe

Open the cook lid.

Locate the probe's mounting holes.

Feed the probe's wire lead down through the shaft hole and out through the wire hole.



Run the Probe Wire Lead

Feed the probe wire lead down between the grill and the pellet hopper, then up and out through the control cutout. Use caution when feeding the wire lead to avoid damaging the wire lead's insulation.

Note

Both the RG1000 and RGTailgater come with three pre drilled holes. The RG1000 will have the screws already installed and you will have to remove them before installing the probe. The RGTailgater will not have the three screws and you will have to install the provided screws.

Attach the Probe to the Side Panel

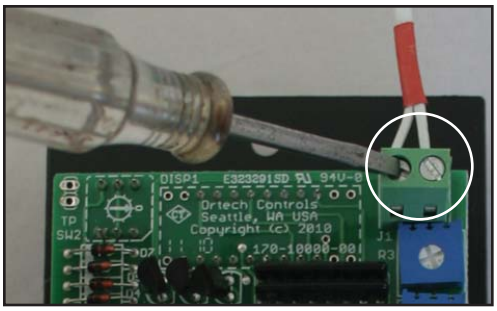
Install the Probe into the shaft hole with the slot positioned over the screw hole. Install the screw from above, down through the slot and through the screw hole.

Connect the Probe to the Control

Warning

Disconnect the grill from AC power. Installing the control while the grill is connected to AC power could result in shock or could cause damage to the control.

Connect the probe lead wires to connector J1 located in the upper right hand corner of the printed circuit board. Use a small flat blade screwdriver to fully open the contacts by turning the set screw counter clockwise. Insert the wires and tighten the contacts by turning the set screw clockwise. You can connect either lead wire to either terminal of connector J1.



ROYALL

Install the Control into the Cutout

Feed the control wiring harness (four plugs with orange, purple, red, black, and white wires) downward into the grill's cutout.

Insert the control into the cutout. Install the control's circuit board into the cutout at an angle to ensure the circuit board fits through the cutout without damage.

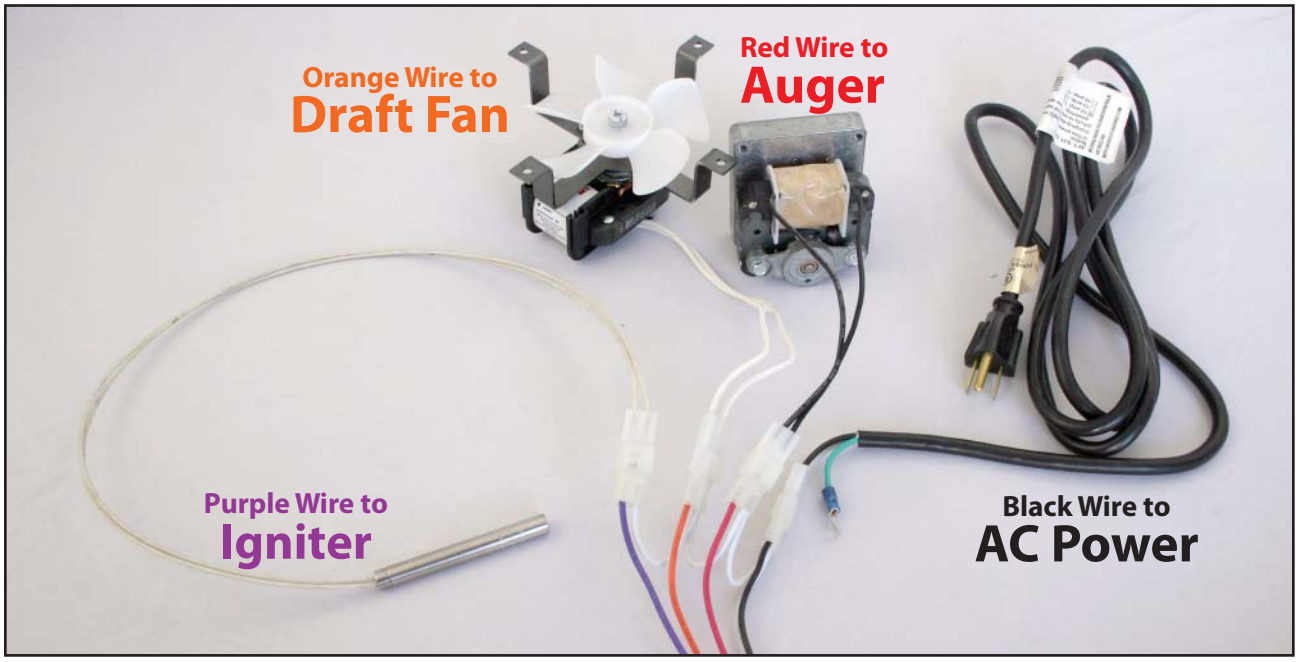
Warning **Do not force the control into the cutout. Bumping electronic components into the edge of the cutout during installation may damage the control.**

Retrieve the two faceplate mounting screws that were used to hold the old control in place.

Using a medium phillips screwdriver, install the top faceplate screw and lightly tighten. Install the bottom faceplate screw and tighten. Tighten the top faceplate screw.

Connect the Control to Grill Components

Connect the fuel feed auger, draft fan, igniter, and AC power to the Digital Control. Working under the hopper, connect the control wiring harness to the grill components as follows:



Control Wiring Harness	Grill Component
Plug with Red Wire	Fuel Feed Auger
Plug with Orange Wire	Draft Fan
Plug with Purple Wire	Igniter
Plug with Black Wire	AC Power

Connect Control's Black Wire to AC Power

Organize Wire Lead
If necessary, use the tie wrap to tie back the temperature probe wire lead and the control's wiring harness to ensure they do not interfere with the draft fan and other grill components.

Attach Hopper Access Cover

TESTING THE GRILL

Prepare the Grill
Set the cook control to the off position. Open the cook lid, remove the internal grill, the drip pan, and the heat detector, to expose the firepot.

Turn the Grill On
Plug the grill into AC power. Turn the cook control switch to the Smoke Position.

Check the Draft Fan
Place your hand above the firepot and verify air movement from the draft fan.

Check the Igniter
Verify the igniter located in the base of the firepot is getting hot. DO NOT TOUCH THE IGNITER!

Check the Fuel Auger
Verify that pellets are flowing into the firepot. If the pellet hopper is empty, open the hopper lid, look inside the hopper and verify the auger is turning.

Turn the Grill Off
Set the cook control to the off position.

Reassemble the Grill
If the grill passes the tests above, reassemble the grill.
If not, refer to the "Troubleshooting" section of this manual.

OPERATION OVERVIEW

LED Readout
Displays grill temperature, smoke settings, idle fuel feed settings, igniter status, low temperature status, and error messages.

Cook Control Switch
Selects off, smoke mode, or one of nine cook mode grill temperatures.

Smoke Control Switch
Selects one of sixteen smoke/idle fuel feed rates.

Cook Mode
Maintains the selected cook temperature.

Smoke Mode
Produces maximum smoke at a low grill temperature.

Microprocessor Control
In cook mode, the temperature of the grill is constantly monitored and a microprocessor operates the draft fan and fuel feed auger to maintain a constant grill temperature.

Manual Control
In smoke mode, the fuel feed rate is set manually by the operator. The grill operates at low temperature to provide maximum smoke.

UNDERSTANDING THE DISPLAY

Numbers
When the grill is connected to AC power, the model number and software version of the control are displayed momentarily.

Temperature
In cook mode and smoke mode, the grill temperature is displayed in 5 degree (Fahrenheit) increments.

Flashing Temperature
In cook mode, the displayed temperature flashes if the grill temperature is below 150 degrees.

In smoke mode, the displayed temperature flashes if the grill temperature is below 110 degrees.

Flashing Dots
The igniter is on.

"P0" - "P15"
When the cook control switch is set to the smoke position, the smoke setting is displayed for 3 seconds.

If you adjust the smoke control switch while in smoke mode, the smoke setting is displayed for 3 seconds.

If you adjust the smoke control switch while in the cook mode, the idle fuel feed rate setting is displayed for 3 seconds.

Flashing "ErH"
The grill temperature exceeded 615 degrees.

Flashing "ErP"
The cook control switch was not in the off position when the grill was connected to AC power.

CONNECTING THE GRILL TO AC POWER

Turn the Grill Off
Set the cook control switch to the off position.

Plug the Grill In
Connect the grill to AC power. The control displays its model number and software version.

If you see "ErP"
If the cook control switch is in the smoke position or any temperature setting when the grill is plugged in, the control will display "ErP" indicating an inadvertent start error. The standard ignition sequence is halted. This feature prevents an inadvertent start. For example, if the grill is stored in the garage, the grill will not ignite if plugged in inadvertently. To clear the error, set the cook control switch to off.

IGNITING THE GRILL

Cook Control
To ignite the grill, set the cook control switch to the smoke position or any temperature setting.

Ignition Sequence
- The draft fan turns on.
- The igniter turns on.
- The fuel feed auger turns on and delivers fuel continuously for two minutes.
- The grill temperature is displayed along with three flashing dots signifying that the igniter is on.

The igniter will turn off when one of the following three conditions is met:
- The igniter has been on for four minutes and the grill temperature has increased by 30 degrees.
- The igniter has been on for four minutes and the grill temperature is greater than 150 degrees.
- The igniter has been on for five minutes.

Once the igniter turns off, if the cook control switch is set to the Smoke position, the grill operates in smoke mode. If the cook control switch is set to a temperature setting, the grill operates in cook mode. The flashing dots are turned off.

COOKING

Cook Control
Set the cook control switch to the desired temperature. The control displays the grill's current temperature.

Cook sequence once the ignition sequence is complete and the igniter turns off, the auger feeds fuel into the fire pot to maintain the set temperature.

Temperature Settings

180 180 degrees
225 225 degrees
250 250 degrees
275 275 degrees
300 300 degrees
325 325 degrees
350 350 degrees
375 375 degrees
High 450 degrees or Maximum Temperature

High Temperature Setting

If the cook control switch is set to high, the grill operates at 450 degrees. If the grill is unable to attain 450 degrees due to ambient temperature and humidity, fuel type and quality, and/or thermal characteristics of the grill, the auger feeds fuel continuously allowing the grill to operate at its maximum temperature.

On Fuel Feed Rate

The on fuel feed rate is the rate the auger delivers fuel while the grill is under the set temperature. In cook mode, the on fuel feed rate is designed to drive the grill's temperature upward to the set temperature and limit temperature overshoot. The on fuel feed rates are preprogrammed into the control and are not adjustable.

Temperature

Setting	Auger On	Auger Off
180	15 seconds	15 seconds
225	always on	0
250	always on	0
275	always on	0
300	always on	0
325	always on	0
350	always on	0
375	always on	0
High	always on	0

Idle Fuel Feed Rate

The idle fuel feed rate is the rate the auger delivers fuel while the grill is idling at or above the set temperature. In cook mode, you can manually adjust the idle fuel feed rate using the Smoke Control switch. See "Understanding Idle Fuel Feed Rate and Smoke Settings" for more information.

Low Temperature

If the grill temperature is less than 150 degrees, the displayed temperature flashes, indicating a low temperature. This is not an error condition and does not affect the operation of the grill. The flashing display is designed to alert the operator that there is some risk of the fire going out.

High Temperature

If the grill temperature is greater than 615 degrees, a flashing "ErH" is displayed indicating a high limit error and the grill shuts down. Refer to the "Error Modes and Messages" section for details.

SMOKING

Smoke Control

Set the cook control switch to smoke. Use the smoke control switch to manually select the auger fuel feed rate. The control displays the grill's current temperature.

Smoke sequence once the ignition sequence is complete and the igniter turns off, the auger delivers fuel at a constant rate determined by the smoke setting (P0 - P15).

Smoke Setting

The smoke fuel feed rate is the rate the auger delivers fuel while the grill is operating in the smoke mode. In smoke mode, manually adjust the fuel feed rate using the smoke control switch to establish the desired temperature and/or smoke output See "Understanding Idle Fuel Feed Rate and Smoke Settings" for more information.

Low Temperature

If the grill temperature is less than 110 degrees, the displayed temperature flashes, indicating a low temperature. This is not an error condition and does not affect the operation of the grill. The flashing display is designed to alert the operator that there is some risk of the fire going out.

High Temperature

If the grill temperature is greater than 615 degrees, a flashing "ErH" is displayed indicating a high limit error and the grill shuts down. Refer to the "Error Modes and Messages" section for details.

UNDERSTANDING IDLE FUEL FEED RATE & SMOKE SETTINGS

Smoke Control Switch

The smoke control switch sets the fuel feed rate (the amount of fuel delivered in a given period of time) when the grill is operating in smoke mode and when the grill is idling in cook mode.

During cook idle or smoke mode, the auger turns on, delivers fuel for 15 seconds, then turns off. The off time is set by the smoke control switch.

"P" Settings

The fuel feed rate setting is displayed momentarily whenever the cook control switch is set to the smoke position. It is also displayed whenever the smoke control switch is adjusted. The setting is designated with the letter "P" and a number. The greater the "P" setting number the greater the auger off time.

Setting	Auger On	Auger Off
P 0	15 seconds	45 seconds
P 1	15	55
P 2	15	65
P 3	15	75
P 4	15	85
P 5	15	95
P 6	15	105
P 7	15	115
P 8	15	125
P 9	15	135
P10	15	140
P11	15	145
P12	15	150
P13	15	155
P14	15	160
P15	15	165

Dual Function

The selected "P" setting controls both the smoke mode fuel feed rate and the cook mode idle fuel feed rate. They are one and the same.

For example, if "P3" is selected using the smoke control switch, the auger delivers fuel for 15 seconds, turns off for 75 seconds, and repeats in smoke mode. It also delivers fuel for 15 seconds, turns off for 75 seconds and repeats while idling in cook mode.

Cook Mode

The idle fuel feed rate is the rate of fuel delivery that dle fuel feed rate maintains the fire in the fire pot without raising the grill's temperature.

In cook mode, whenever the grill temperature is at or above the set temperature, the auger runs at the idle fuel feed rate. If the grill temperature is below the set temperature, the auger operates per the on fuel feed rate.

We recommend the "P2" setting as the default idle fuel feed rate while in cook mode.

For the experienced operator, the auger idle fuel feed rate can be adjusted to improve the grill's performance. For example, to optimize temperature stability at a high temperature setting, select "P1" or "P0" to increase the auger idle fuel feed rate or, if due to ambient conditions the grill is unable to cool down enough to reach a low temperature setting such as 180 degrees, select "P3", "P4", or higher to decrease the idle fuel feed rate.

High Temperature Idle Fuel Feed Rate

In cook mode, the idle fuel feed rate for the high temperature setting is preprogrammed into the control. The idle fuel feed auger timing at high is 15 seconds on / 15 seconds off and is independent of the smoke control switch "P" setting. The preprogrammed fuel feed rate helps maintain the elevated cooking temperature at the high setting.

Smoke Mode Fuel Feed Rate

In smoke mode, increasing the "P" setting decreases the fuel feed rate, lowering the grill temperature. Start at setting "P2", adjust the "P" setting manually for the desiredtemperature and/or smoke output.

ERROR MODES AND MESSAGES

Inadvertent Start Error (ErP)

If the cook control switch is set to Smoke or to a temperature setting at the time the grill is plugged in, the control will display "ErP" indicating an inadvertent start error. The standard ignition sequence is halted.

This feature prevents an inadvertent start. For example, if the grill is stored in the garage, the grill will not ignite if plugged in inadvertently.

To clear the error, set the cook control switch to the off position

High Temperature Limit Error (ErH)

If the grill temperature exceeds 615 degrees, the control limit error (ErH) displays "ErH" indicating a high temperature limit error.

The fuel feed auger is turned off, the igniter is turned off, and the draft fan is turned off.

To clear the error, set the cook control switch to the off position. If the error will not clear, your temperature detector is not functioning normally See "Display is Flashing 'ErH'" in the "Troubleshooting" section.

Flashing In cook mode, the displayed temperature flashes if the grill temperature is below 150 degrees.

This is not an error condition and does not affect the operation of the grill. The flashing display is designed to alert the operator that there is some risk of the fire going out.

In smoke mode, the displayed temperature flashes if the grill temperature is below 110 degrees.

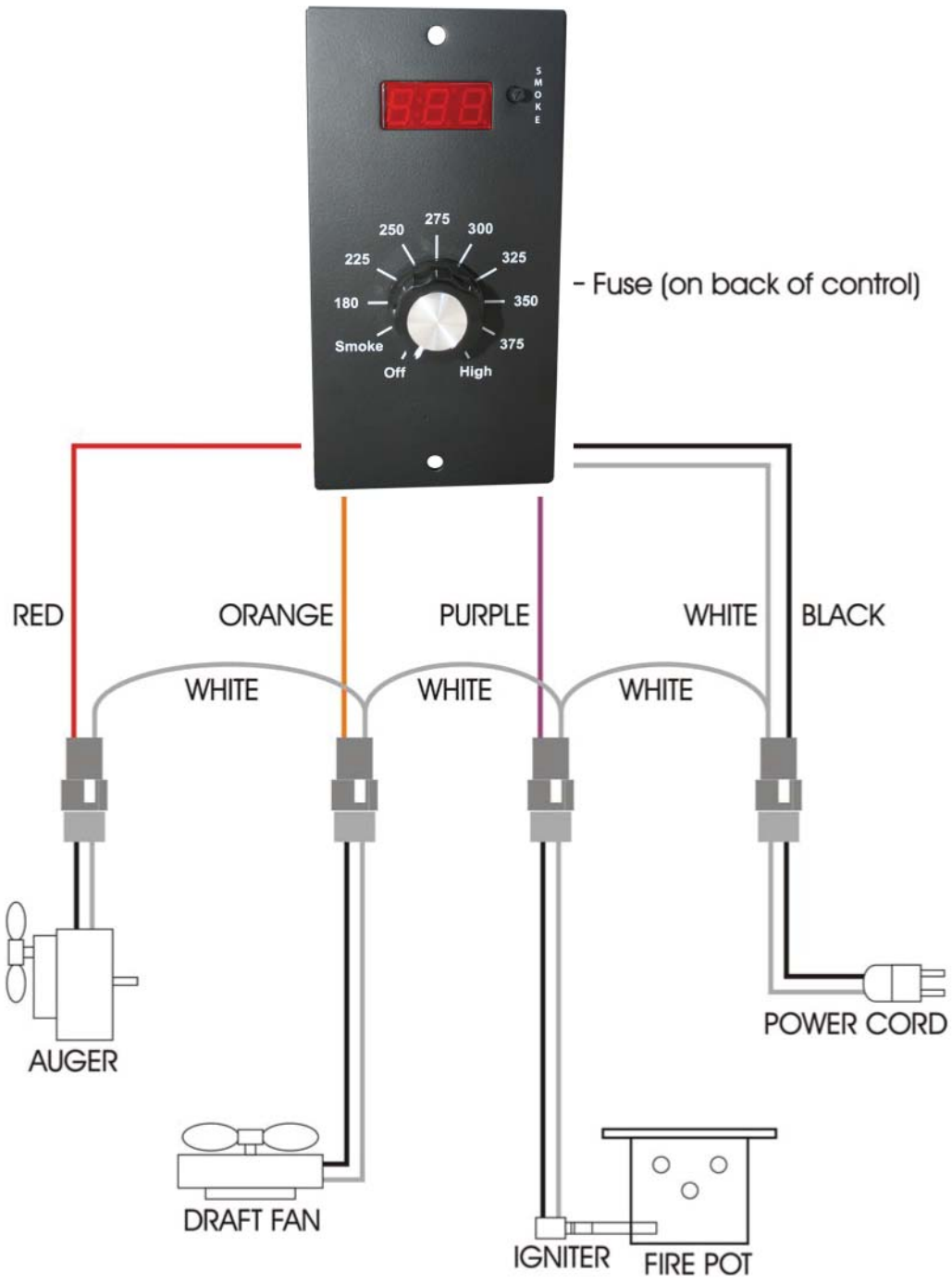
This is not an error condition and does not affect the operation of the grill. The flashing display is designed to alert the operator that there is some risk of the fire going out.

Flashing Dots

The igniter is on.

This is not an error condition and does not affect the operation of the grill. The flashing dots are designed to alert the operator that the igniter is on.

WIRING DIAGRAM

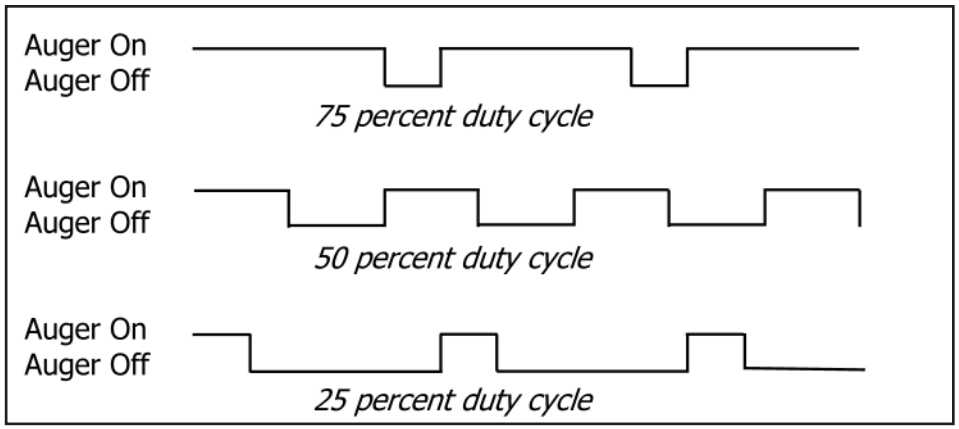


AC AUGER THEORY OF OPERATION

AC Auger

The grill is equipped with an AC auger. AC augers operate at a single speed and deliver fuel at a constant rate while on The fuel feed rate (amount of fuel delivered in a given period of time) is adjusted by varying the on and off time intervals.

Duty Cycle The ratio of time the auger is on is sometimes referred to as the duty cycle and is expressed as a percentage For example, if the auger is always on, its duty cycle is 100 percent If the auger is on half the time, its duty cycle is 50 percent, etc.



Idle and Smoke Fuel Feed Rates and "P" Settings

When the TR-100 is in smoke mode or idling in cook mode, the AC auger is turned on and delivers fuel continuously for 15 seconds and is then turned off. The smoke control switch sets the auger off time. The smoke mode/cook mode idle fuel feed rates are as follows:

Setting	Auger On	Auger Off	Duty Cycle
P 0	15 seconds	45 seconds	25.0 percent
P 1	15	55	21.4
P 2	15	65	18.8
P 3	15	75	16.7
P 4	15	85	15.0
P 5	15	95	13.6
P 6	15	105	12.5
P 7	15	115	11.5
P 8	15	125	10.7
P 9	15	135	10.0
P10	15	140	9.7
P11	15	145	9.4
P12	15	150	9.1
P13	15	155	8.8
P14	15	160	8.6
P15	15	165	8.3

TROUBLESHOOTING

Warning **Always disconnect the grill from AC power before accessing the control for service or working under the grill.**

Removing the control from the grill, installing the control into the grill, or working under the grill while the grill is connected to AC power could result in shock or could damage the control.

Digital Control Display is Blank

cook control switch is set to the off position. Set cook control switch to the smoke position or any temperature setting.

Circuit breaker on AC outlet is tripped. Reset wall power outlet circuit breaker.

Control is disconnected from grill AC power. Verify control wiring harness plug with black wire is connected to AC power.

Digital Control Display is Blank

Control AC line fuse is blown. Replace control's fuse F1 with provided spare fuse or a replacement fuse.

A blown AC line fuse may be caused by several conditions including shorted grill component lead wires, a jammed auger, or a failing igniter. Inspect the grill's components and component lead wires if replacement fuses are continually blown.

Grill Will Not Ignite

No fuel in firepot. Fill hopper with good, dry fuel. Verify auger is properly connected to control. Clear auger if jammed. Replace auger and/or auger motor if defective.

No draft air flow

Verify draft fan is properly connected to control and operating normally. Replace draft fan if defective.

No ignition heat source

Verify igniter is properly connected to control and operating normally.

Replace igniter if defective

Control is defective

Contact Royall Grills technical support.

Fire Goes Out
Set cook control switch to the off position and allow grill to cool.

No fuel in hopper
Fill hopper with good, dry fuel.

No fuel in firepot
Verify the control is properly connected to auger. Clear auger if jammed. Replace auger and/or auger motor if defective.

Unburned fuel in firepot
Adjust smoke control switch (decrease the "P" setting) to increase auger idle fuel feed rate.

No draft air flow
Verify the control is properly connected to draft fan and operating normally. Replace draft fan if defective.

Control is defective
Contact Royall Grills technical support.

Grill Temperature at the 180 Degree Cook Setting is too High
Auger idle fuel feed rate is too high. Adjust smoke control switch (increase the "P" setting) to decrease idle fuel feed rate.

Probe is defective
Replace probe

Control is defective
Contact Royall Grills technical support.

Grill Temperature at the High Cook Setting is too Low
At the high temperature setting, the auger runs continually until the grill temperature reaches 450 degrees.

Grill lid is open
Close grill lid. Grill is designed to operate with grill lid closed.

Insufficient amount of fuel in fire pot
Clear auger if jammed. Tighten auger connection to auger motor shaft if slipping. Replace auger and/or auger motor if defective.

Damp fuel source
Replace damp fuel with good dry fuel.

Adverse operating conditions
Shield grill from cold wind and/or rain. Grill may not be able to attain 450 degrees in an extremely cold operating environment.

Unexpected Temperature Displayed
Auger idle fuel feed rate is too high. Adjust smoke control switch (increase the "P" setting) to decrease idle fuel feed rate.

Auger idle fuel feed rate is too low
Adjust smoke control switch (decrease the "P" setting) to increase idle fuel feed rate.

Grill lid is open
Close grill lid. Grill is designed to operate with grill lid closed.

Probe is defective
Contact Royall Grills technical support.

Control is defective
Contact Royall Grills technical support.

Grill Temperature Displayed is Different Than Dome Thermometer
This is normal. The displayed temperature is the precise temperature at the Probe. The dome thermometer is located in a different position inside the grill.

Displayed Temperature is Flashing
Low grill temperature. This is not an error condition and does not affect the operation of the grill. The flashing display is designed to alert the operator that there is some risk of the fire going out.

Display Always Reads 0 Degrees
Probe wire leads are shorted. Check connection at control terminal J1. Fully open contacts by turning set screw counter clockwise. Reinsert wires and tighten contacts by turning set screw clockwise. Check the insulation for shorts throughout the wire run from detector to control terminal J1.

Probe is defective
Contact Royall Grills technical support.

Control is defective
Contact Royall Grills technical support.

Display is Flashing "ErP"
Inadvertent start error. The grill was plugged in with the cook control switch in the smoke position or set to a temperature setting. Set the cook control switch to the off position.

Display is Flashing "ErH"
Overtemperature error. The grill temperature exceeded 615 degrees and shut off automatically. Set the cook control switch to the off position.

Probe wire leads are open
Check connection at control terminal J1. Fully open contacts by turning set screw counter clockwise. Reinsert wires and tighten contacts by turning set screw clockwise. Check for breaks in the wire throughout the wire run from probe to control terminal J1.

Probe is defective
Contact Royall Grills technical support.

Control is defective
Contact Royall Grills technical support.